

BEFORE THE  
POSTAL REGULATORY COMMISSION  
WASHINGTON, D.C. 20268-0001

PERIODIC REPORTING  
(PROPOSALS ONE THROUGH FIVE)

Docket No. RM2012-5

PETITION OF THE UNITED STATES POSTAL SERVICE FOR THE  
INITIATION OF A PROCEEDING TO CONSIDER PROPOSED CHANGES IN  
ANALYTICAL PRINCIPLES (PROPOSALS ONE THROUGH FIVE)

Pursuant to 39 C.F.R. § 3050.11, the Postal Service requests that the Commission initiate a rulemaking proceeding to consider five proposals to change analytical principles relating to the Postal Service's periodic reports. The proposals, labeled Proposals One through Five, are discussed in the attached text.

Respectfully submitted,

UNITED STATES POSTAL SERVICE

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## **PROPOSAL ONE**

### **Elimination of Separate Delivery Costs for Carrier Route Letters, Flats, and Parcels**

#### **Proposal:**

Currently, the Postal Service reports separate delivery costs by shape for Standard Mail Carrier Route letters, flats, and parcels in public folder 19 of the Annual Compliance Report (ACR) (e.g., for Fiscal Year 2011, folder USPS-FY11-19). In FY 2011, these costs were:

| <b>Shape</b>                  | <b>Flats</b> | <b>Letters</b> | <b>Parcels</b> |
|-------------------------------|--------------|----------------|----------------|
| <b>Delivery Costs (Cents)</b> | 11.061       | 33.462         | 154.667        |

The Postal Service proposes ceasing the separate, shape-based reporting of the above costs.

#### **Rationale:**

During its review of the Postal Service's FY 2011 ACR, the Commission asked the Postal Service to explain the Standard Mail Carrier Route letter unit delivery cost estimate's year-to-year volatility and its divergence from the unit delivery cost estimate of Standard Mail Carrier Route flats.<sup>1</sup> In response, the Postal Service stated that the Carrier Route letter unit delivery cost estimate is unreliable and explained the reasons for its unreliability.<sup>2</sup> In the FY 2011 Annual Compliance Determination, the Commission accepted the Postal Service's explanation, noted that "[t]he Commission understands that the Postal Service is encouraging the use of 5-Digit automation for letters and discouraging the use of Carrier Route letters," and stated that "[t]he Postal Service may

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<sup>1</sup> Chairman's Information Request No. 4, Docket No. ACR2011 (Feb. 22, 2012), at Question 4.

<sup>2</sup> Responses of the United States Postal Service to Questions 1-9, 12, 14, 16-18, and 21-25 of Chairman's Information Request No. 4, Docket No. ACR2011 (Feb. 29, 2012), at response to Question 4.

elect to initiate a rulemaking with the Commission if it wishes to eliminate the Carrier Route letter rate category or aggregate Carrier Route letter cost data with Carrier Route flat data.”<sup>3</sup>

Given that Carrier Route flats represent over 99 percent of Carrier Route volume, the Postal Service believes that the latter course is appropriate. Carrier Route mail’s delivery costs are already reported in Cost Segments 6, 7, and 10 of the Public Cost Segments and Components Report, contained in public folder 2 of the ACR. If this proposal is approved and the disaggregated delivery costs currently reported in public folder 19 are no longer reported, the costs reported in public folder 2 would suffice as a substitute.

**Impact:**

If this proposal had been adopted before the FY 2011 ACR, the unit delivery costs listed above would have been replaced with an aggregate Carrier Route unit delivery cost of 11.285 cents.

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<sup>3</sup> Annual Compliance Determination Report Fiscal Year 2011, Docket No. ACR2011 (Mar. 28, 2012), at 121.

## **PROPOSAL TWO**

### **Calculation of Scanning Costs for All Non-Accountable Delivery Scans**

#### **Proposal:**

The Postal Service proposes extending the established methodology for calculating the city carrier street scanning costs of Delivery Confirmation, non-accountable insurance items, and Express Mail with signature waiver to all non-accountable delivery scans performed by city carriers during street activities (Cost Segment 7).

#### **Rationale:**

Last year, the Postal Service introduced the USPS Tracking Barcode to better track parcels; however, the costs of USPS Tracking Barcode delivery scans performed by city carriers during street activities are not currently calculated. In addition, the Postal Service may introduce other non-accountable delivery scans in the future. This proposal will ensure that the city carrier street costs of all such delivery scans are properly calculated and accounted for.

Under the established methodology, city carrier street scanning costs are calculated by multiplying the unit scan time (6.23 seconds) by the number of scans by the wage rate. The number of scans is determined using the City Carrier Cost System (CCCS). The total scan cost is removed from the Cost Segment 7 accrued costs before the variabilities are applied, and the scan cost is then assigned to the responsible host product based on CCCS. This proposal will extend this methodology to all non-accountable delivery scans performed by city carriers during street activities.

**Impact:**

The following table shows the impact of this proposal on Cost Segments 6 and 7 based on FY 2011 costs and products.

| CLASS, SUBCLASS, OR SPECIAL SERVICE        | TOTAL C/S<br>6 & 7 AS<br>FILED | TOTAL C/S 6 & 7<br>AS PROPOSED | DIFFERENCE<br>(PROPOSED-<br>FILED) | %<br>DIFFERENCE |
|--|--------------------------------|--------------------------------|------------------------------------|-----------------|
| <b>Market Dominant Products</b>            |                                |                                |                                    |                 |
| <b>FIRST-CLASS MAIL</b>                    |                                |                                |                                    |                 |
| SINGLE-PIECE LETTERS                       | 1,654,450                      | 1,653,276                      | (1,173)                            | -0.1%           |
| SINGLE-PIECE CARDS                         | 102,920                        | 102,847                        | (73)                               | -0.1%           |
| PRESORT LETTERS                            | 1,166,878                      | 1,166,017                      | (860)                              | -0.1%           |
| PRESORT CARDS                              | 62,053                         | 62,006                         | (47)                               | -0.1%           |
| SINGLE PIECE FLATS                         | 214,062                        | 214,514                        | 451                                | 0.2%            |
| PRESORT FLATS                              | 75,587                         | 75,573                         | (14)                               | 0.0%            |
| SINGLE PIECE PARCELS                       | 112,497                        | 116,107                        | 3,611                              | 3.2%            |
| PRESORT PARCELS                            | 2,944                          | 2,938                          | (6)                                | -0.2%           |
| <b>TOTAL FIRST-CLASS</b>                   | <b>3,391,391</b>               | <b>3,393,278</b>               | <b>1,888</b>                       | <b>0.1%</b>     |
| <b>STANDARD MAIL</b>                       |                                |                                |                                    |                 |
| HIGH DENSITY & SATURATION LETTERS          | 135,380                        | 135,261                        | (120)                              | -0.1%           |
| HIGH DENSITY & SATURATION FLATS & PARCELS  | 316,705                        | 316,436                        | (270)                              | -0.1%           |
| CARRIER ROUTE                              | 585,706                        | 585,443                        | (263)                              | 0.0%            |
| LETTERS                                    | 1,355,749                      | 1,354,660                      | (1,089)                            | -0.1%           |
| FLATS                                      | 682,293                        | 682,129                        | (165)                              | 0.0%            |
| NOT FLAT-MACHINABLES & PARCELS             | 134,126                        | 136,729                        | 2,603                              | 1.9%            |
| <b>TOTAL STANDARD MAIL</b>                 | <b>3,209,960</b>               | <b>3,210,656</b>               | <b>697</b>                         | <b>0.0%</b>     |
| <b>PERIODICALS</b>                         |                                |                                |                                    |                 |
| IN COUNTY                                  | 26,795                         | 26,779                         | (16)                               | -0.1%           |
| OUTSIDE COUNTY                             | 451,269                        | 451,117                        | (151)                              | 0.0%            |
| <b>TOTAL PERIODICALS</b>                   | <b>478,064</b>                 | <b>477,896</b>                 | <b>(168)</b>                       | <b>0.0%</b>     |
| <b>PACKAGE SERVICES</b>                    |                                |                                |                                    |                 |
| SINGLE-PIECE PARCEL POST                   | 26,927                         | 27,976                         | 1,049                              | 3.9%            |
| BOUND PRINTED MATTER FLATS                 | 17,551                         | 17,553                         | 2                                  | 0.0%            |
| BOUND PRINTED MATTER PARCELS               | 54,188                         | 54,413                         | 225                                | 0.4%            |
| MEDIA AND LIBRARY MAIL                     | 26,859                         | 27,657                         | 798                                | 3.0%            |
| <b>TOTAL PACKAGE SERVICES</b>              | <b>125,524</b>                 | <b>127,598</b>                 | <b>2,075</b>                       | <b>1.7%</b>     |
| <b>US POSTAL SERVICE</b>                   | <b>58,744</b>                  | <b>58,736</b>                  | <b>(8)</b>                         | <b>0.0%</b>     |
| <b>FREE MAIL</b>                           | <b>6,275</b>                   | <b>6,269</b>                   | <b>(6)</b>                         | <b>-0.1%</b>    |
| <b>Total Domestic Market Dominant Mail</b> | <b>7,269,957</b>               | <b>7,274,434</b>               | <b>4,478</b>                       | <b>0.1%</b>     |

| CLASS, SUBCLASS, OR SPECIAL SERVICE            | TOTAL C/S<br>6 & 7 AS<br>FILED | TOTAL C/S 6 & 7<br>AS PROPOSED | DIFFERENCE<br>(PROPOSED-<br>FILED) | %<br>DIFFERENCE |
|--|--------------------------------|--------------------------------|------------------------------------|-----------------|
| <b>Ancillary Services</b>                      |                                |                                |                                    |                 |
| CERTIFIED                                      | 128,060                        | 127,370                        | (689)                              | -0.5%           |
| COD  | 517                            | 514                            | (3)                                | -0.6%           |
| INSURANCE                                      | 6,342                          | 6,322                          | (20)                               | -0.3%           |
| REGISTRY                                       | 2,019                          | 2,012                          | (7)                                | -0.3%           |
| OTHER ANCILLARY SERVICES                       | 142,771                        | 142,340                        | (431)                              | -0.3%           |
| <b>Total Domestic Market Dominant Services</b> | <b>279,709</b>                 | <b>278,558</b>                 | <b>(1,150)</b>                     | <b>-0.4%</b>    |
| <b>Total Domestic Market Dominant Costs</b>    | <b>7,549,665</b>               | <b>7,552,992</b>               | <b>3,327</b>                       | <b>0.0%</b>     |
| <b>Total Domestic Competitive Costs</b>        | <b>316,962</b>                 | <b>322,849</b>                 | <b>5,887</b>                       | <b>1.9%</b>     |
| <b>INTERNATIONAL MAIL</b>                      | <b>45,842</b>                  | <b>45,730</b>                  | <b>(112)</b>                       | <b>-0.2%</b>    |
| <b>TOTAL VOLUME VARIABLE COSTS</b>             | <b>7,912,470</b>               | <b>7,921,571</b>               | <b>9,102</b>                       | <b>0.1%</b>     |
| <b>OTHER</b>                                   | <b>7,890,076</b>               | <b>7,880,974</b>               | <b>(9,102)</b>                     | <b>-0.1%</b>    |
| <b>GRAND TOTAL</b>                             | <b>15,802,545</b>              | <b>15,802,545</b>              | <b>-</b>                           |                 |

## **PROPOSAL THREE**

### **Changes in IOCS Encirclement Rules**

#### **Proposal:**

In the In-Office Cost System (IOCS), encirclement is the process of assigning the cost of handling a mailpiece with an Extra Service to the Extra Service rather than to the host mailpiece. Encirclement is warranted when an Extra Service is the primary reason that an employee has to handle a mailpiece. The Postal Service proposes to update the encirclement rules for certain Extra Services to reflect changes in operations and to correct inconsistencies.

Specifically, for the Inbound Registered Extra Service, the operations listed in Table 1 below will no longer be encircled. Further, for the C.O.D., Certified, Insured, and Signature Confirmation Extra Services, encirclement will be added for the operations listed in Table 2 below.

**TABLE 1**

| IOCS<br>Op Code | Operation                                |
|-----------------|--|
| 01              | PREPARATION OF MAIL                      |
| 02              | OUTGOING DISTRIBUTION                    |
| 03              | MANAGED MAIL                             |
| 04              | INCOMING PRIMARY DISTRIBUTION            |
| 05              | INCOMING SECONDARY DISTRIBUTION          |
| 06              | MIXED INCOMING/OUTGOING                  |
| 07              | ACCEPTING MAIL FROM PATRON ON PLATFORM   |
| 08              | OTHER PLATFORM WORK                      |
| 10              | ALL OTHER WORK                           |
| 11              | DISTRIBUTION TO POST OFFICE BOX SECTIONS |
| 12              | CALLER                                   |
| 13              | MIXED POST OFFICE BOX/CALLER             |
| 14              | CENTRAL MAIL MARK-UP                     |
| 15              | CITY CARRIER DISTRIBUTION                |
| 16              | RURAL CARRIER DISTRIBUTION               |
| 20              | SORTATION TO POST OFFICE BOXES           |
| 21              | EXPEDITED DELIVERY                       |

| IOCS Op Code | Operation  |
|--------------|--|
| 22           | EXPRESS MAIL   |
| 27           | DISTRIBUTION TO CARRIER - SORTING TO SECTOR SEGMENT    |
| 28           | DISTRIBUTION TO CARRIER - SORTING TO ABC/WALK SEQUENCE |
| 29           | DISTRIBUTION TO CARRIER - OTHER                        |
| 30           | OTHER MAIL PROCESSING                                  |

**TABLE 2**

| IOCS OpCode | IOCS Operation Category                      |
|-------------|--|
| 18*         | REGISTRY ONLY*                               |
| 24          | WINDOW POST OFFICE BOX                       |
| 25          | WINDOW CALLER                                |
| 26          | WINDOW GENERAL DELIVERY & CUSTOMER HOLD MAIL |

\* Encirclement will not be added for Operation Code 18 for Signature Confirmation.

### **Rationale:**

Currently, all Registered mail, both domestic and International, is encircled in all operations. This is consistent with operations for domestic Registered and outbound International Registered since such pieces receive hand-to-hand transfers. However, in 2009, the Postal Service changed the operating procedures for inbound Registered such that those pieces now travel in the regular letters and flats mailstream rather than in the Registered mailstream.<sup>4</sup> The modifications proposed in Table 1 result from this change in procedures.

In addition, the Postal Service has reviewed operations involving other Extra Services and identified instances where encirclement should be added; these are reflected in Table 2. Specifically, mailpieces associated with C.O.D., Certified, and Insurance are sometimes handled in Registry cages and should therefore be encircled. Also, C.O.D., Certified, Insured, and Signature Confirmation should be encircled at the

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<sup>4</sup> International Inbound Registered Mail Procedures, 74 Fed. Reg. 14,932 (Apr. 2, 2009).



window if the clerk is performing a delivery function.

**Impact:**

The impact of this proposal on IOCS costs for clerks and mail handlers is summarized in Table 3 below. These are changes in Cost Segment 3 (mail processing, window, claims and inquiry) only. The proposal will not affect in-office carrier costs (Cost Segment 6).

TABLE 3: Change in IOCS due to changes in encirclement rules  
FY11 Dollar-weighted Cost Segment 3 Direct tallies (\$000's)

| Product                | Original    | Proposed    | %Change |
|------------------------|-------------|-------------|---------|
| Inbound Registered     | \$14,362    | \$8,858     | -38.3%  |
| Inbound Surf LC/AO     | \$3,268     | \$3,479     | 6.5%    |
| Inbound Air LC/AO      | \$37,753    | \$42,951    | 13.8%   |
| COD                    | \$601       | \$990       | 64.8%   |
| Certified              | \$128,793   | \$148,083   | 15.0%   |
| Insurance              | \$33,905    | \$34,484    | 1.7%    |
| Signature Confirmation | \$4,494     | \$5,170     | 15.1%   |
| First-Class            | \$2,796,637 | \$2,777,652 | -0.7%   |
| Parcel Post            | \$113,799   | \$113,333   | -0.4%   |
| Competitive Products   | \$756,358   | \$755,383   | -0.1%   |

## **PROPOSAL FOUR**

### **Changes to IOCS Reporting Codes**

#### **Proposal:**

The Postal Service proposes to make the following changes to In-Office Cost System (IOCS) activity codes and operation codes:

- (1) streamline activity codes by eliminating codes that are no longer used for costing (see Table 1); and
- (2) combine the operation codes for Outgoing Primary Distribution and Outgoing Secondary Distribution into one code, and add a code for Managed Mail Distribution (see Table 2).

**TABLE 1**

| Current Activity Code |   | Proposed Activity Code |                      |
|-----------------------|---|------------------------|----------------------|
| 1022                  | COMBINED CARDS (VARIOUS LEVELS OF SORTATION)        | 1040                   | FC Cards – Presort   |
| 1035                  | CARDS - AUTOMATION PRESORT                          | 1040                   | FC Cards – Presort   |
| 1040                  | CARDS - NONAUTOMATION PRESORT                       | 1040                   | FC Cards – Presort   |
| 1045                  | CARDS - AUTOMATION CARRIER ROUTE PRESORT            | 1040                   | FC Cards – Presort   |
| 1080                  | LETTERS - NONAUTOMATION PRESORT                     | 1080                   | FC Letters – Presort |
| 1081                  | COMBINED LETTERS (VARIOUS LEVELS OF SORTATION)      | 1080                   | FC Letters – Presort |
| 1085                  | LETTERS - AUTOMATION CARRIER ROUTE PRESORT          | 1080                   | FC Letters – Presort |
| 1086                  | LETTERS - AUTOMATION PRESORT                        | 1080                   | FC Letters – Presort |
| 1340                  | REGULAR - NONAUTOMATION PRESORT                     | 1340                   | Std Regular Letters  |
| 1341                  | COMBINED REGULAR - NONAUTOMATION/AUTOMATION PRESORT | 1340                   | Std Regular Letters  |
| 1345                  | REGULAR - AUTOMATION PRESORT                        | 1340                   | Std Regular Letters  |
| 1420                  | MEDIA MAIL - SINGLE PIECE                           | 1420                   | Media Mail           |
| 1425                  | COMBINED MEDIA MAIL - SORTED AND SINGLE-PIECE       | 1420                   | Media Mail           |
| 1430                  | MEDIA MAIL – PRESORT                                | 1420                   | Media Mail           |
| 2080                  | FLATS - NONAUTOMATION PRESORT                       | 2080                   | FC Flats - Presort   |
| 2081                  | COMBINED FLATS (VARIOUS LEVELS OF SORTATION)        | 2080                   | FC Flats - Presort   |
| 2086                  | FLATS - AUTOMATION PRESORT                          | 2080                   | FC Flats - Presort   |
| 2340                  | REGULAR - NONAUTOMATION PRESORT                     | 2340                   | Std Regular Flats    |
| 2341                  | COMBINED REGULAR - NONAUTOMATION/AUTOMATION PRESORT | 2340                   | Std Regular Flats    |
| 2345                  | REGULAR - AUTOMATION PRESORT                        | 2340                   | Std Regular Flats    |
| 2420                  | MEDIA MAIL - SINGLE PIECE                           | 2420                   | Media Mail           |
| 2425                  | COMBINED MEDIA MAIL - Presort AND SINGLE-PIECE      | 2420                   | Media Mail           |

|      |  |      |                      |
|------|--|------|----------------------|
| 2430 | MEDIA MAIL – PRESORT                           | 2420 | Media Mail           |
| 2460 | BOUND PRINTED MATTER - SINGLE PIECE RATE       | 2460 | Bound Printed Matter |
| 2465 | COMBINED BOUND PRINTED MATTER - SINGLE/PRESORT | 2460 | Bound Printed Matter |
| 2480 | BOUND PRINTED MATTER – PRESORT                 | 2460 | Bound Printed Matter |
| 2495 | BOUND PRINTED MATTER - CARRIER ROUTE           | 2460 | Bound Printed Matter |
| 3420 | MEDIA MAIL - SINGLE PIECE                      | 3420 | Media Mail           |
| 3425 | COMBINED MEDIA MAIL - PRESORT AND SINGLE-PIECE | 3420 | Media Mail           |
| 3430 | MEDIA MAIL – PRESORT                           | 3420 | Media Mail           |
| 3460 | BOUND PRINTED MATTER - SINGLE PIECE RATE       | 3460 | Bound Printed Matter |
| 3465 | COMBINED BOUND PRINTED MATTER - SINGLE/PRESORT | 3460 | Bound Printed Matter |
| 3480 | BOUND PRINTED MATTER – PRESORT                 | 3460 | Bound Printed Matter |
| 3495 | BOUND PRINTED MATTER - CARRIER ROUTE           | 3460 | Bound Printed Matter |
| 4420 | MEDIA MAIL - SINGLE PIECE                      | 4420 | Media Mail           |
| 4425 | COMBINED MEDIA MAIL - PRESORT AND SINGLE-PIECE | 4420 | Media Mail           |
| 4430 | MEDIA MAIL – PRESORT                           | 4420 | Media Mail           |
| 4460 | BOUND PRINTED MATTER - SINGLE PIECE RATE       | 4460 | Bound Printed Matter |
| 4465 | COMBINED BOUND PRINTED MATTER -SINGLE/PRESORT  | 4460 | Bound Printed Matter |
| 4480 | BOUND PRINTED MATTER – PRESORT                 | 4460 | Bound Printed Matter |
| 4495 | BOUND PRINTED MATTER - CARRIER ROUTE           | 4460 | Bound Printed Matter |

TABLE 2

| Current Operation Code             | Proposed Operation Code  |
|------------------------------------|--------------------------|
| 02 Outgoing Primary Distribution   | 02 Outgoing Distribution |
| 03 Outgoing Secondary Distribution | 02 Outgoing Distribution |
|                                    | 03 Managed Mail          |

### **Rationale:**

With regard to the first set of changes, a number of activity codes are not used for costing and can be eliminated with no impact. These include codes that distinguish automation versus non-automation mail for First-Class Mail and Standard Mail,<sup>5</sup> and codes that distinguish presort from single-piece for Media Mail and Bound Printed Matter. In addition, some products, such as the various Package Services products, do not have a letter-shaped category. Activity codes corresponding to a letter-shaped

<sup>5</sup> See Opinion and Recommended Decision, Docket No. R2006-1 (Feb. 26, 2007), at ¶ 5159 (Commission's decision to use a single CRA estimate for First-Class Mail automation and non-automation presort) and ¶ 5590 (Commission's decision to use a single CRA estimate for Standard Mail automation and non-automation presort).

category for such products can be eliminated.

With respect to the second set of changes, it has proven difficult to accurately classify Managed Mail schemes in IOCS Question 18. Therefore, IOCS data collectors will be asked to identify Managed Mail schemes separately from other scheme categories, and accordingly an operation code for Managed Mail is being added. Furthermore, the distinction between Outgoing Primary and Outgoing Secondary distribution operations is not used in the Cost and Revenue Analysis or other portions of the Annual Compliance Report. The Postal Service therefore proposes to combine Outgoing Primary and Outgoing Secondary scheme work into a single "Outgoing Distribution" category.

In addition to proposing the two sets of changes above, the Postal Service notes that it has separately made a third set of changes to account for recent transfers of products to the competitive product list. Specifically, the transfers of Parcel Select Lightweight and First-Class Package Service to the competitive product list last year necessitated new activity codes for Parcel Select Lightweight and revisions to the codes for First-Class Mail Parcels and Irregular Parcels and Pieces (IPPs). The new and revised codes are listed in Table 3 below.

TABLE 3

| Previous Activity Code |   | New Activity Code |   |
|------------------------|---|-------------------|---|
| 3060                   | FC IPPs under 8oz                               | 3060              | IPP'S UNDER 8 OZS. - FC Parcel (Retail)             |
| 3080                   | FC IPPs under 8oz - Nonautomation Presort       | 3080              | IPP'S UNDER 8 OZS. - FC Package Service             |
| 4060                   | FC Parcels up to 13 oz.                         | 4060              | PARCELS UP TO 13 OZS. - First-Class Parcel (Retail) |
| 4080                   | FC Parcels up to 13 oz. - Nonautomation presort | 4080              | PARCELS UP TO 16 OZS. - First-Class Package Service |
|                        |   | 2360              | Parcel Select Lightweight                           |
|                        |   | 3360              | Parcel Select Lightweight                           |
|                        |   | 4360              | Parcel Select Lightweight                           |

**Impact:**

This proposal will have no impact on the costs of any products.

## **PROPOSAL FIVE**

### **Change to Methodology of Distributing Costs Incurred by Vehicle Service Drivers**

#### **Proposal:**

The Postal Service proposes to replace the current method of distributing Vehicle Service Drivers (VSD) costs in the Cost Segment 8 worksheets with a new method based on the new Transportation Cost System Highway Vehicle Service Drivers (TRACS-VSD) subsystem. Specifically, the TRACS Intra-SCF distribution key that is currently used to distribute VSD costs in Cost Segment 8 would be replaced with a quarterly distribution key obtained from TRACS-VSD. Annual estimates would be obtained by summing the postal quarter estimates, as is currently done with purchased transportation.

#### **Rationale:**

Vehicle service drivers provide transportation for the efficient movement of large mail volumes among post offices, stations, branches, and other postal facilities, including air mail facilities as well as various private firms. In FY 2011, \$585 million of VSD attributable costs (including piggybacked costs) were distributed to postal products, using Intra-SCF cubic-foot miles as a proxy distribution key. The use of this proxy was approved by the Commission in 2008 as an interim measure; the Commission believed that the proxy represented an improvement over the previous RPW cubic-foot based proxy, but it stressed that the Postal Service should conduct a good faith effort to directly measure products' relative use of VSD transportation.<sup>6</sup>

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<sup>6</sup> Order No. 115, Docket No. RM2008-2 (Oct. 10, 2008), at 38-39.

Historically, an independent VSD distribution key has been unavailable in TRACS, largely due to the lack of a VSD sampling frame from which reliable sample-based estimates of VSD activity could be obtained. Recently, the Postal Service has developed a reliable sampling frame that has enabled the development of an ongoing statistical system (TRACS-VSD), similar to the four TRACS subsystems representing purchased highway contract types: Inter-NDC, Intra-NDC, Inter-SCF, and Intra-SCF. The Postal Service therefore believes that it is now appropriate to replace the current Cost Segment 8 distribution key with a quarterly distribution key obtained from TRACS-VSD.

For more information about the VSD sampling frame, sample design, data collection procedure, and estimation, refer to the TRACS-VSD statistical documentation, in the attached Appendix.

**Impact:**

The table below compares the FY 2011 VSD Cost Segment 8 costs calculated using the current and proposed methodologies. The current methodology represents the FY 2011 VSD Cost Segment 8 costs filed with the Commission (with the piggyback factor applied). The proposed methodology is based on respective preliminary FY 2012 year-to-date (Quarter 1 and Quarter 2) distribution keys applied to FY 2011 VSD Cost Segment 8 dollars (after the piggyback factor is applied).

Fiscal Year 2011 - Commercially Sensitive Non-Public Material -- Do Not Disclose - PRC Version  
C/S 8 VEHICLE SERVICE DRIVERS

| Line No. | Class, or Sub-class                        | CRA Class | Attributable Cost<br>\$(000) | Piggyback Factor<br>\$(000) | Original FY11 CS8 costs w/Piggyback using proxy Intra-Sof key<br>\$(000) | FY11 CS8 costs w/Piggyback using VSD sample key <sup>1</sup><br>\$(000) | Net Changes<br>\$(000) | FY11 Volume<br>(000) | Change in Cost per Piece<br>\$ |
|----------|--|-----------|------------------------------|-----------------------------|--|---|------------------------|----------------------|--------------------------------|
|          | <b>UNITS</b>                               |           |                              |                             |  |   |                        |                      |                                |
|          | <b>Market Dominant Products</b>            |           |                              |                             |  |   |                        |                      |                                |
| 1        | <b>FIRST-CLASS MAIL</b>                    |           |                              |                             |  |   |                        |                      |                                |
| 2        | SINGLE-PIECE LETTERS                       | 3         | 39,555                       | 1.618                       | \$ 63,983  | \$ 42,925   | \$ (21,058)            | 24,550,824           | -\$0.001                       |
| 3        | SINGLE-PIECE CARDS                         | 4         | 1,160                        | 1.618                       | \$ 1,876   | \$ 1,822  | \$ (55)                | 1,295,941            | \$0.000                        |
| 4        | PRESORT LETTERS                            | 8         | 25,525                       | 1.618                       | \$ 41,289  | \$ 46,424   | \$ 5,135               | 41,740,735           | \$0.000                        |
| 5        | PRESORT CARDS                              | 9         | 1,496                        | 1.618                       | \$ 2,420   | \$ 2,014  | \$ (406)               | 2,753,763            | \$0.000                        |
| 6        | FLATS                                      | 14        | 18,916                       | 1.618                       | \$ 30,598  | \$ 41,100   | \$ 10,501              | 2,230,920            | \$0.005                        |
| 7        | PARCELS                                    | 15        | 17,162                       | 1.618                       | \$ 27,761  | \$ 33,090   | \$ 5,329               | 637,962              | \$0.008                        |
| 10       | <b>TOTAL FIRST-CLASS</b>                   | 100       | 103,812                      | 1.618                       | \$ 167,924   | \$ 167,375  | \$ (549)               | 73,210,165           | \$0.000                        |
| 11       | <b>STANDARD MAIL</b>                       |           |                              |                             |  |   |                        |                      |                                |
| 12       | HIGH DENSITY & SATURATION LETTERS          | 21        | 1,238                        | 1.618                       | \$ 2,003   | \$ 1,549  | \$ (453)               | 5,653,875            | \$0.000                        |
| 13       | HIGH DENSITY & SATURATION FLATS & PARCELS  | 22        | 3,541                        | 1.618                       | \$ 5,728   | \$ 5,307  | \$ (421)               | 11,424,568           | \$0.000                        |
| 14       | CARRIER ROUTE LETTERS                      | 23        | 11,755                       | 1.618                       | \$ 19,015  | \$ 29,515   | \$ 10,500              | 9,335,928            | \$0.001                        |
| 15       | LETTERS                                    | 25        | 23,373                       | 1.618                       | \$ 37,808  | \$ 29,352   | \$ (8,456)             | 50,584,189           | \$0.000                        |
| 16       | FLATS                                      | 26        | 23,827                       | 1.618                       | \$ 38,542  | \$ 45,644   | \$ 7,102               | 6,783,186            | \$0.001                        |
| 17       | NOT FLAT-MACHINABLES & PARCELS             | 27        | 7,665                        | 1.618                       | \$ 12,399  | \$ 10,185   | \$ (2,214)             | 733,770              | -\$0.003                       |
| 18       | <b>TOTAL STANDARD MAIL</b>                 | 105       | 71,399                       | 1.618                       | \$ 115,494   | \$ 121,552  | \$ 6,058               | 84,515,517           | \$0.000                        |
| 19       | <b>PERIODICALS</b>                         |           |                              |                             |  |   |                        |                      |                                |
| 20       | IN-COUNTY                                  | 31        | 45                           | 1.618                       | \$ 73  | \$ -  | \$ (73)                | 661,561              | \$0.000                        |
| 21       | OUTSIDE COUNTY                             | 32        | 33,921                       | 1.618                       | \$ 54,870  | \$ 59,069   | \$ 4,199               | 6,415,178            | \$0.001                        |
| 22       | <b>TOTAL PERIODICALS</b>                   | 110       | 33,965                       | 1.618                       | \$ 54,941  | \$ 59,069   | \$ 4,128               | 7,076,739            | \$0.001                        |
| 23       | <b>PACKAGE SERVICES</b>                    |           |                              |                             |  |   |                        |                      |                                |
| 24       | SINGLE-PIECE PARCEL POST                   | 41        | 19,385                       | 1.618                       | \$ 31,357  | \$ 33,631   | \$ 2,274               | 70,218               | \$0.032                        |
| 25       | BOUND PRINTED MATTER FLATS                 | 42        | 4,139                        | 1.618                       | \$ 6,695   | \$ 5,259  | \$ (1,436)             | 251,831              | -\$0.006                       |
| 26       | BOUND PRINTED MATTER PARCELS               | 43        | 3,144                        | 1.618                       | \$ 5,096   | \$ 6,850  | \$ 1,755               | 245,282              | \$0.007                        |
| 27       | MEDIA AND LIBRARY MAIL                     | 44        | 8,392                        | 1.618                       | \$ 13,575  | \$ 8,675  | \$ (4,900)             | 107,829              | -\$0.045                       |
| 28       | <b>TOTAL PACKAGE SERVICES</b>              | 115       | 35,061                       | 1.618                       | \$ 56,714  | \$ 54,415   | \$ (2,299)             | 675,160              | -\$0.003                       |
| 29       | <b>US POSTAL SERVICE</b>                   | 125       | 3,180                        | 1.618                       | \$ 5,144   | \$ 4,701  | \$ (443)               | 434,596              | -\$0.001                       |
| 30       | <b>FREE MAIL</b>                           | 130       | 829                          | 1.618                       | \$ 1,341   | \$ 2,528  | \$ 1,187               | 61,854               | \$0.019                        |
| 31       | <b>Total Domestic Market Dominant Mail</b> | 135       | 248,246                      | 1.618                       | \$ 344,844   | \$ 355,224  | \$ 10,380              | 165,298,872          | \$0.000                        |
| 37       | <b>Total Domestic Competitive Mail</b>     | 175       | 106,471                      | 1.618                       | \$ 172,225   | \$ 151,053  | \$ (21,172)            | 1,213,166            | -\$0.017                       |
| 37       | <b>INTERNATIONAL MAIL</b>                  | 185       | 7,158                        | 1.618                       | \$ 11,579  | \$ 24,670   | \$ 13,092              | 959,826              | \$0.014                        |
| 38       | <b>TOTAL MAIL</b>                          |           | 361,875                      | 1.618                       | \$ 585,362   | \$ 585,362  | \$ -                   |                      |                                |
| 39       | <b>TOTAL ATTRIBUTABLE</b>                  | 198       | 361,875                      | 1.618                       | \$ 585,362   | \$ 585,362  | \$ -                   |                      |                                |
| 40       | <b>OTHER</b>                               | 199       | 236,880                      |                             |  |   |                        |                      |                                |
| 41       | <b>GRAND TOTAL</b>                         | 200       | 598,735                      |                             |  |   |                        |                      |                                |

<sup>1</sup> VSD sample keys for Qtr1 and Qtr2 FY12 applied to FY11 CS8 piggyback dollars.



# Transportation Cost System – Highway Subsystem Vehicle Service Drivers (VSD) Mode Statistical Documentation

## I. Overview

The TRACS-Highway Subsystem is a continuous, ongoing statistical sampling system. On a quarterly basis, the TRACS-Highway Subsystem produces an independent distribution key for each of five modes. The first four modes correspond to the following purchased highway contract groups: Inter-NDC<sup>7</sup>, Intra-NDC, Inter-SCF<sup>8</sup>, Intra-SCF. Transportation provided by Vehicle Service Drivers (VSD) comprises the fifth mode. All TRACS-Highway modes utilize a similar multi-stage sample design, though for the TRACS-VSD mode, the first-stage sampling unit differs and an extra sampling stage is added. All subsequent sampling stages, involving van utilization, containers (stratified by type), and items or handling units (stratified by type), are common to all TRACS-Highway Subsystem modes.

The TRACS-VSD primary sampling unit (PSU) is defined as a *MODE-ORIG-DEST-DOW-WINDOW* combination. Here, MODE is the VSD transportation contract type, ORIG and DEST are the paired origin and destination facilities (the latter is the test site), DOW (day of week) is the S-M-T-W-R-F-S designation, and WINDOW is a 2-hour truck arrival time segment.

The TRACS-VSD mode utilizes a stratified, multi-stage sample design where PSU's are selected probability proportional to size (PPS). The size measure is the expected number of arriving trucks. The PSU's are stratified into three groups according to origin and destination facility type along with 2-hour arrival window as follows: Group-1 consists of truck stops at mail processing facilities (other than Group-3); Group-2 represents truck stops at non-mail processing facilities; and Group-3 represents trucks leaving non-mail processing facilities during late night or early morning hours that stop at mail processing facilities.

The sub-unit or second-stage sampling unit (SSU) is an arriving truck. There may be one or more SSU's for a PSU from which one SSU is randomly selected for measurement. At the third stage of sampling within a sampled SSU, a sub-sample of pallets, wheeled containers and loose items<sup>9</sup> off-loaded at the test facility is randomly selected. From each wheeled container selected at the third stage, a fourth-stage sample of items is randomly selected. For pallets and loose items selected at the third stage, there is no fourth-stage sample. All selected mail is recorded.

Weight and volume information by mail category is recorded for the contents of sampled

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<sup>7</sup> Network Distribution Center (formerly Bulk Mail Center).

<sup>8</sup> Sectional Center Facility.

<sup>9</sup> Loose items include pieces, parcels, bundles, sacks, trays, or tubs. Items that are not in wheeled containers or on pallets are termed loose items.

items. Weights are converted to cubic-feet based on Density Study data. For sampled pallets, the dimensions of the pallet and the percentage of mail on the pallet occupied by mail category are recorded. Data collectors also record the percentage of vehicle floor space occupied by palletized mail, containerized items, and loose items (to establish cubic-feet utilized). From the sample data, the cubic-foot-miles<sup>10</sup> transported are estimated by mail category. A distribution key representing the proportion of cubic-foot-miles by mail category is calculated.

## II. Statistical Study Design

The universe under study is all mail moved by VSD transportation among post offices, stations and branches, and other postal facilities, including air mail facilities as well as various private firms.

The following table provides the total number of VSD truck stops by sampling stratum for PQ2, FY2012:

Table 1. VSD SSU's by Stratum – PQ2, FY 2012

| Type | Mail Processing<br>(1) | Non-Processing<br>(2) | Other<br>(3) | Total     |
|------|------------------------|-----------------------|--------------|-----------|
| VSD  | 849,651                | 1,142,216             | 480,214      | 2,472,080 |

### 1. First- and Second-Stage Sample

A sample of 550 first-stage units, or primary sampling units (PSU's), is randomly selected from the frame file each quarter.<sup>11</sup> The 550 VSD PSU's (unequal sizes) are selected probability proportional to size (PPS) within each stratum without replacement (wor) by systematic selection. On the test date at the destination facility (test site), one secondary sampling unit (SSU), or arriving truck, is randomly selected from all  $M(i)$  arriving trucks for the sampled PSU, providing a fixed secondary sample of size  $m(i)=1$  unit. There may be one or more arriving trucks at a PSU.

The first- and second-stage sampling methodology (pps and fixed-size srs, respectively) provides an equal probability self-weighting sample (and estimator), wherein, all SSU's in a stratum (h) have the same (equal) probability of selection. Under this design, the probability of selecting an SSU from any PSU (i) in stratum (h) is the product of the stratum's first- and second-stage selection probabilities:  $n_h/M_h = (n_h * M_{hi}/M_h) * (m_{hi}/M_{hi})$ ,

<sup>10</sup> Given the practical and administrative difficulties of maintaining a highway mileage file for the very large number of VSD routes and stops, along with the difficulty in consolidating all of the segment data for a specific VSD route trip, each VSD test is assigned one mile and one leg (segment). The cubic-foot-miles and leg (segment) are retained as placeholders for consistency with other highway subsystem modes. See page 5.

<sup>11</sup> 550 tests are consistent with the number of tests and volume variable transportation dollars distributed by the TRACS Inter-NDC and Intra-NDC modes.

where  $M_{hi}$  is the count of all SSU's in PSU (i),  $M_h$  is the count of all SSU's in stratum (h), and  $m_{hi}$  (=1) is the number of sampled SSU's in PSU (i).

The sample size of 550 first-stage units is allocated among the three strata as follows: a fixed-size sample of 25 PSU's is obtained from the third stratum, then the remaining 525 units are allocated between the first and second strata proportional to each stratum's total SSU count.<sup>12</sup>

The VSD sampling frame is compiled four weeks before the beginning of each postal quarter. The TRACS-VSD primary sampling unit is defined as a MODE-ORIG-DEST-DOW-WINDOW combination. Here, MODE= VSD transportation, ORIG= origin facility, DEST= test facility, DOW= day-of-week (S-M-T-W-R-F-S), and WINDOW= 2-hour time segment (1...12). The sub-unit or second-stage sampling unit is an arriving truck of which there may be one or more for a PSU. To create the frame, a recent snapshot of VSD scheduled trip information is extracted from Vehicle Information Transportation Analysis & Logistics (VITAL). In addition, four weeks of actual arrival trip information is extracted from Surface Visibility (SV). VITAL data are merged with SV data. Where there is a match, all VITAL trip information is retained; otherwise, SV trip information is retained. After eliminating routes with blank arrival time, invalid O-D facility codes, or infrequently running trips, the final VSD frame for the quarterly sample selection is completed.

The following table shows the first-stage sample size for the first two quarters of FY2012.

Table 2: Sample Size by PQ – FY 2012

| Postal Quarter | VSD |
|----------------|-----|
| PQ1            | 550 |
| PQ2            | 550 |

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<sup>12</sup> Typically the truck stops in the third group have only empty equipment.

## 2. Third-Stage Sample

For each selected truck stop, the following truck utilization data are recorded: (1) the percentage of empty floor space, which is further split based on the percentage of empty equipment and empty floor space; (2) the percentage of floor space occupied by mail unloaded at the test facility; and (3) the percentage of floor space occupied by mail remaining on the truck. The utilization data, based on square footage of floor space, are collected at the time the vehicle is first opened, but before any mail is removed from or added to the vehicle.

The third-stage sample is a stratified sample of off-loaded wheeled containers, pallets and loose items. Mail being off-loaded from the vehicle is stratified into five groups depending on the type of mail and the level of containerization. These five groups, or strata, are: pallets, wheeled containers, non-containerized Express Mail, loose sacks, and other loose items. The percentage of floor space occupied by each of the five strata is recorded before selecting the third-stage sample. The following rules are used to select the third-stage sample:

- Up to two pallets are selected.
- For wheeled containers, if two or fewer containers are unloaded, all are selected; otherwise, a random start and a skip interval of three are used to select containers for sampling. If the combination of the random start and skip interval results in less than two containers being selected, then a second container is also selected. At most, five containers are selected.
- All loose Express Mail items (i.e., sacks, parcels, etc.) are selected.
- Up to eight loose sacks and other loose items are selected, with at least one of each item type. The item types sampled in TRACS-Highway are trays, tubs, sacks, bundles, loose parcels and pieces. Items are selected in proportion to their occurrence on the truck.

## 3. Fourth-Stage Sample

The fourth-stage sample is a stratified sample of items from each selected wheeled container. Mail in the wheeled container is stratified by item type, and one of each item type is selected. Prior to the selection of the item, the data collector records the container type and the percentage of the container occupied by each item type. These data are used to estimate the cubic-feet for each item type in the container.

There is no fourth-stage sample for pallets, loose Express Mail, loose sacks or other loose items selected at the third stage. All selected mail is recorded.

For each selected pallet or item, regardless of whether it was selected at the third- or fourth-stage, two types of data are recorded: item information and mail information. For

pallets, the item information includes the dimensions (height, length and width) of the pallet. The pallet dimensions are used for expansion. For mail information, the percentage of pallet space taken up by mail for up to four mail categories is recorded. For items, the Routing Barcode (or label content line) is scanned or entered. The specific item type is also entered. The item type determines the applicable expansion formula. For mail in items, the data recorded include the number of pieces and weight by mail category. Weights are converted to cubic-feet based on Density Study data.

### III. Estimation

A quarterly distribution key is produced. Data are expanded in a two-step process to obtain cubic-foot-miles by mail category. In the first step, test data are expanded to the unloaded truck capacity. In the second step, the sampled cubic-foot-miles from individual tests in each stratum are summed and then expanded by the reciprocal of the first- and second-stage PPS selection probability. The estimated strata totals are then summed by mail category to produce the estimate of total cubic-foot-miles by mail category. The ratios of cubic-foot-miles for each mail category to total cubic-foot-miles across all mail categories comprise the distribution key.

The VSD process outlined above differs slightly compared to the other four highway modes. Additionally, given the difficulties of maintaining a highway mileage file for the very large number of VSD routes and stops, and the difficulty of consolidating all of the segment data for a specific VSD route trip, the distribution key is based on the assignment of one mile to each VSD sampled test. For each VSD test, the number of legs or segments is also defined as one. Because VSD trips are typically short in distance and highly concentrated in urban areas, the distance factor is less relevant than for the other highway modes; however, since VSD is a mode of the TRACS-Highway Subsystem and shares much of the same methodology and processes, VSD nevertheless makes reference to cubic-foot-miles, and legs or segments.

The program used to expand sample data and generate the distribution key is TRACSSMN.HWYq12.EDITEXP.CNTL(ZEXP). It has three inputs:

- (1) TRACSSMN.HIGHWAY.PQq12.EDITED.DATA,
- (2) TRACSSMN.CUFT.DEFAULT.FLAT.TEXT.FY12, and
- (3) TRACSSMN.MAILCODE.FLAT.CODE.FY12.

The first input is the final analysis file ('Z-file') that contains edited sample data, with information necessary for expansion. The second input provides the cubic-foot values for various types of containers and items sampled in TRACS. The third file contains the three digit numeric codes for all mail categories and the density factor associated with each.

The following notation is used in the expansion process:

|               |  |
|---------------|--|
| $h$           | stratum, $h=1,2,3$ ;   |
| $n$           | number of tests performed in a quarter;  |
| $i$           | PSU test index within the stratum;   |
| $N$           | number of frame units for the quarter;   |
| $l$           | frame index;   |
| $Day$         | number of days in a week that a vehicle operates;  |
| $Capacity$    | vehicle capacity in cubic-feet;  |
| $\%Empty$     | percentage of vehicle space that is empty;   |
| $\%Unload$    | percentage of space occupied by mail unloaded;   |
| $\%Remain$    | percentage of space occupied by mail remaining on the truck;   |
| $\%Container$ | percentage of space occupied by unloaded wheeled containers;   |
| $\%Pallet$    | percentage of space occupied by unloaded pallets;  |
| $\%Express$   | percentage of space occupied by unloaded Express Mail items;   |
| $\%Sack$      | percentage of space occupied by unloaded non-containerized sacks;  |
| $\%Other$     | percentage of space occupied by unloaded other loose items;  |
| $S$           | total legs traveled on this trip, up to the test stop;   |
| $s$           | segment index, or leg, on the trip $\{s=1,2,\dots,S\}$ ;   |
| $o$           | origin index – the segment of the origin facility where the item was loaded onto the vehicle $\{o \in 1,2,\dots,S\}$ ; |
| $mile_s$      | segment mileage;   |
| $r$           | mail category, $r \in R$ ;   |
| $w$           | net weight of mail in pounds;  |
| $d$           | density factor in cubic-feet/pound;  |
| $cuft$        | mail cubic-feet;   |
| $cfm$         | mail cubic-foot-mile;  |
| $y$           | distribution key for the quarter; and  |
| $M,m$         | 2nd-stage VSD SSU population and sample sizes (counts), respectively.  |

Although the expansion process starts from the bottom and works its way up, it is useful to look at the formulation, conceptually, from the top down.

The distribution key estimate for the  $r^{\text{th}}$  mail category (element),

$$y_r = \frac{cfm_r}{cfm} = \frac{cfm_r}{\sum_r cfm_r},$$

is the ratio of the cubic-foot-miles for the mail category ( $r$ ), divided by the total cubic-foot-miles across all mail categories. The estimate of total cubic-foot-miles for a mail category ( $r$ ), obtained from first- and second-stage expansion for a self-weighting two-stage sample, is:

$$cfm_r = \sum_h \sum_i^{n_h} w_h cfm_{hir} .$$

Here, the weight ( $w_h$ ) is the reciprocal of the probability of selecting an SSU within stratum ( $h$ ), i.e.,  $w_h = 1/f_h$ . This factor is constant within each stratum ( $h$ ) under a self-weighting (equal probability) sample design. The variable ( $cfm_{hir}$ ) is the estimated cubic-foot-miles for mail category ( $r$ ) for a sampled PSU ( $i$ ) in stratum ( $h$ ). Letting ( $M_h$ ) denote the total number of truck stops in stratum ( $h$ ), and ( $n_h$ ) the total number of tests (PSU's) in the stratum, then the probability of selecting an SSU in stratum ( $h$ ),  $f_h$ , can be expressed as:

$$f_h = \frac{n_h}{M_h} = \left( n_h \frac{M_{hi}}{M_h} \right) \left( \frac{m_{hi}}{M_{hi}} \right)$$

On the right-hand side above, the parenthesis represent first- and second-stage sampling unit selection probabilities, respectively. Note that the  $M_{hi}$  in the numerator and denominator cancel. Also, the number of second-stage sampled units ( $m_{hi}$ ) for each sampled PSU ( $i$ ) is one under the VSD design.

The cubic-foot-miles for a test is:

$$cfm_{hir} = \sum_{s=1}^S cuft_{hirs} \times mile_{his} ,$$

where  $cuft_{hirs}$  is the cubic-feet of mail that traveled on the  $s^{th}$  segment and was unloaded at the test facility, and  $mile_{his}$  is the mileage of the segment.

Furthermore,

$$cuft_{hirs} = \sum_{o=1}^s cuft_{hiro} ,$$

where  $cuft_{hiro}$  is the cubic-feet of mail loaded onto the vehicle at the beginning of the  $o^{th}$  segment and then unloaded at the test facility.

## 1. Expanding to Unloaded Truck Capacity

Dropping the stratum subscript, the first step in the expansion process produces  $cuft_{iro}$ , which for the  $r^{th}$  mail category is the estimated cubic-feet of mail that was loaded onto the vehicle at the  $o^{th}$  facility and unloaded at the test facility, adjusted to the unloaded truck capacity.

The unloaded truck capacity, in cubic-feet, is the product of the vehicle capacity and

the recorded percentage of capacity taken up by all mail unloaded at the test facility. It is also the sum of cubic-feet of unloaded mail across all mail categories:

$$Unloaded_i = Capacity_i \times \%Unloaded_i = \sum_r cuft_{irS} = \sum_r \sum_{o=1}^S cuft_{iro}.$$

All mail unloaded from the test vehicle is sampled. There are three types of third-stage sampling units: (1) pallets; (2) loose-items; and (3) containers. The unloaded cubic-feet of mail is developed by computing the cubic-feet for each third-stage type separately, and then summing across third-stage types. Hence,

$$cuft_{iro} = cuft_{iro}^{(Pallet)} + cuft_{iro}^{(LooseItems)} + cuft_{iro}^{(Containers)}$$

### 1a. Palletized mail expansion formulas

At most two pallets are selected for each test. All mail on selected pallets is sampled. Data collectors measure the height ( $H$ ), length ( $L$ ), and width ( $W$ ) of each selected pallet and enter the mail category and percentage ( $\%p$ ) of the pallet space taken up by mail for up to four mail categories. Let  $j$  denote the sampled pallet index:  $j=1$  and  $2$ . For the pallet loaded on the vehicle at the  $o^{th}$  origin facility, the actual cubic-feet on pallet  $j$  occupied by mail category  $r$  is

$$H_{ioj} W_{ioj} L_{ioj} \times \% p_{iroj}$$

Hence the truck space taken up by mail class  $r$ , loaded at origin facility  $o$ , on unloaded pallets is

$$cuft_{iro}^{(Pallet)} = Capacity_i \times \%Pallet_i \times \frac{\sum_{j \in o} H_{ioj} W_{ioj} L_{ioj} \times \% p_{iroj}}{\sum_{o=1}^S \sum_{j=1}^2 H_{ioj} W_{ioj} L_{ioj}}. \quad (1)$$

The data set 'PALLET' in the 'Z-file' contains all the sample data for pallets.

### 1b. Loose-item (non-containerized) mail expansion formulas

All the loose item mail found on the truck is stratified into: non-containerized Express Mail, loose sacks, and other loose items. The truck utilization percentages are collected



for each. All the non-containerized Express Mail is sampled. For loose sacks and other loose items, a total of eight items is sampled in each test.

Additional notation:

|      |                 |                                    |
|------|-----------------|------------------------------------|
| $j$  | $j=1,2,\dots,J$ | sampled Express Mail,              |
| $k$  | $k=1,2,\dots,K$ | sampled sack                       |
| $l$  | $l=1,2,\dots,L$ | sampled other item ( $K+L\leq 8$ ) |
| $TW$ |                 | tare weight of the item            |

The mail recorded from the sampled items is expanded to the truck space taken up by each category of loose items through a two-step process.

Step 1) The net weight of the mail in the sampled item is expanded to the cubic-feet of the item by multiplying the item's gross cubic-feet by the proportion of cubic-feet occupied by mail category  $r$ :

$$\begin{aligned}
 cuft_{iroj}^{(g)} &= cuft_{ioj}^{(g)} \times \frac{w_{iroj} d_r}{\sum_r w_{iroj} d_r} = cuft_{ioj}^{(g)} \times \frac{cuft_{iroj}}{cuft_{ioj}} \\
 cuft_{irok}^{(g)} &= cuft_{ioj}^{(g)} \times \frac{w_{irok} d_r}{\sum_r w_{irok} d_r} = cuft_{ioj}^{(g)} \times \frac{cuft_{irok}}{cuft_{ioj}} \\
 cuft_{iol}^{(g)} &= cuft_{ioj}^{(g)} \times \frac{w_{iol} d_r}{\sum_r w_{iol} d_r} = cuft_{ioj}^{(g)} \times \frac{cuft_{iol}}{cuft_{ioj}}
 \end{aligned} \tag{2}$$

The density factor  $d_r$  in (2) converts net weight of the mail to the cubic-feet it occupies in the item. The item's gross cubic-feet varies, depending on the type of item, as follows:

a) for trays, flat tubs and con-cons, the gross cubic-feet of the item,  $cuft_{iol}^{(g)}$  is known for each separate item type.

b) for bundles and loose items, the gross cubic-feet of the item,  $cuft_{ioj}^{(g)}$  or  $cuft_{iol}^{(g)}$ , is the same as the net cubic-feet of the mail in the item, or:

$$\begin{aligned}
 cuft_{ioj}^{(g)} &= \sum_r w_{ioj} d_r = \sum_r cuft_{ioj} = cuft_{ioj} \\
 cuft_{iol}^{(g)} &= \sum_r w_{iol} d_r = \sum_r cuft_{iol} = cuft_{iol}
 \end{aligned}
 \tag{3}$$

c) for sacks, pouches, and Express Mail, the gross cubic–feet of the item is the total cubic–feet of the mail plus the tare cubic–feet for the sack/pouch:

$$\begin{aligned}
 cuft_{ioj}^{(g)} &= \sum_r w_{ioj} d_r + TW_j \times d_j = \sum_r cuft_{ioj} + cuft_j^{(Tr)} \\
 cuft_{iok}^{(g)} &= \sum_r w_{iok} d_r + TW_k \times d_k = \sum_r cuft_{iok} + cuft_k^{(Tr)} \\
 cuft_{iol}^{(g)} &= \sum_r w_{iol} d_r + TW_l \times d_l = \sum_r cuft_{iol} + cuft_l^{(Tr)}
 \end{aligned}
 \tag{4}$$

The tare weight,  $TW$  in (4), is the difference between the gross and the net weight of the sampled item.

Step 2) The gross cubic–feet of mail in a sampled item is further expanded to the truck capacity utilized by the three sampling groups:

$$cuft_{iro}^{(LooseItem)} = Capacity_i \times \left[ \begin{aligned} & (\% Express_i \times \frac{\sum_j cuft_{ioj}^{(g)}}{S} + \\ & \sum_{o=1} \sum_j cuft_{ioj}^{(g)} \\ & \% Sack_i \times \frac{\sum_k cuft_{iok}^{(g)}}{S} + \\ & \sum_{o=1} \sum_k cuft_{iok}^{(g)} \\ & \% Other_i \times \frac{\sum_l cuft_{iol}^{(g)}}{S} ) \\ & \sum_{o=1} \sum_l cuft_{iol}^{(g)} \end{aligned} \right]
 \tag{5}$$

All loose–item data are contained in the SAS data set ‘FORM3L’ in the ‘Z–file’.

### 1c. Containerized mail expansion formulas

Every third wheeled container, up to a maximum of five, is sampled. For each sampled container, the data collector records the percentage of the container taken up by each of the item types found in the container. One item is randomly selected from each of the item types. For loose parcel items in wheeled containers, up to four items are selected. For each selected item, all the mail is counted. The pieces and weight are recorded by mail category.

Additional notations:

|          |   |
|----------|---|
| $c$      | Sampled container $\{c=1,2,\dots,C: C \leq 5\}$ ;       |
| $t$      | Item type, $t = \text{Parcel, Sack, ...}$               |
| $p$      | Percentage of container space taken up by the item type |
| CONTCUFT | Container size in cubic-feet.                           |

The following steps are taken to expand the containerized mail:

Step 1) The net weight of the mail in the sampled item is first expanded to the gross cubic-feet of the sampled item by multiplying the item's gross cubic-feet by the proportion of the item occupied by mail category  $r$ .

$$cuft_{iroct}^{(g)} = cuft_{ioct}^{(g)} \times \frac{w_{iroct} d_r}{\sum_r w_{iroct} d_r} = cuft_{ioct}^{(g)} \times \frac{cuft_{iroct}}{cuft_{ioct}} \quad (6)$$

The density factor in (6) converts the net weight of mail into the cubic-feet it occupies in the item. The item's gross cubic-feet varies, depending on the type of item, as follows:

a) for trays, flat boxes, and con-cons, the gross cubic-feet,  $cuft_{ioct}^{(g)}$  is known for each separate item type.

b) for bundles and other loose pieces, the gross cubic-feet,  $cuft_{ioct}^{(g)}$  is the same as the net cubic-feet of mail in the item, i.e.

$$cuft_{ioct}^{(g)} = \sum_r w_{iroct} d_r = \sum_r cuft_{iroct} = cuft_{ioct}.$$

c) for sacks, pouches, and Express Mail, the gross cubic-foot,  $cuft_{ioct}^{(g)}$ , is the mail cubic-feet plus the tare cubic-feet of the sack:

$$cuft_{ioct}^{(g)} = \sum_r w_{iroct} d_r + TW_t \times d_t = \sum_r cuft_{iroct} + cuft_t^{(Tr)}.$$

The tare weight,  $TW$  in (c) above, is the difference between the gross and net weight of the sampled item.

Step 2) The gross cubic–feet of mail in a sampled item are further expanded to the sampled container:

$$cuft_{iroc}^{(g)} = \frac{CONTCUFT_c}{\sum_{o=1}^S \sum_t p_{ioct}} \sum_t \left( p_{ioct} \times \frac{cuft_{iroct}^{(g)}}{cuft_{ioct}^{(g)}} \right) \quad (7)$$

The container size,  $CONTCUFT$ , for various type containers, is known for each separate container type.

Step 3) The resulting gross cubic–feet of mail is finally expanded to the truck capacity utilized by all unloaded containers,

$$cuft_{iro}^{(Container)} = Capacity_i \times \%Container_i \times \frac{\sum_{c=1}^C cuft_{iroc}^{(g)}}{\sum_{c=1}^C CONTCUFT_c} \quad (8)$$

The SAS data set ‘FORM3C’ in the ‘Z–file’ contains all the containerized sample data.

#### 1d. Total cubic–feet of mail unloaded

The cubic–feet of mail which was loaded on the truck at origin  $o$  and unloaded at the test stop is the sum of the three second stage sampling unit types:

$$cuft_{iro} = cuft_{iro}^{(Pallet)} + cuft_{iro}^{(LooseItem)} + cuft_{iro}^{(Container)} . \quad (9)$$

When added across the origin and the mail category, we obtain the reported unloaded capacity of the vehicle.

$$Unloaded_i = Capacity_i \times \%Unloaded_i = \sum_r \sum_{o=1}^S cuft_{iro} .$$

## 2. Cubic-Foot-Mile Calculation

Summing equation (9) across all the origin facilities up to a specific leg produces the cubic-foot estimates for the mail that traveled on the leg:

$$cuft_{irs} = \sum_{o=1}^s cuft_{iro} . \quad (10)$$

Each sample record contains a complete list of legs the mail item traveled on the vehicle. For each leg, the sample record also specifies the origin and destination facilities and the highway miles between the two. The cubic-foot-miles for each leg are the product of the cubic-feet estimates and the highway miles for the leg. The cubic-foot-miles is the sum of such products across all legs:

$$cfm_{ir} = \sum_{s=1}^S \{cuft_{irs} \times mile_{is}\} . \quad (11)$$

The cubic-foot-mile calculation specified in equation (11) requires highway miles for all leg segments on sampled routes. The highway-mileage file contains highway miles for over 7,000 facility pairs, and covers over 90% of the Inter-NDC, Intra-NDC, and Inter-SCF routes. However, the coverage is less than 50% for Intra-SCF routes. As a result, the default mileage for Intra-SCF tests is one mile:

$$cfm_{ir} = \sum_{s=1}^S cuft_{irs} \times 1mile . \quad (12)$$

For VSD, given the difficulties of maintaining a highway mileage file for the very large number of VSD routes and stops, and the difficulty of consolidating all of the segment data for a specific VSD route trip, each VSD test is also assigned one mile.

Additionally, each VSD test is assigned one segment ( $s=1$ ).<sup>13</sup> As a result, for the VSD mode, the equation (12) value for ( $S$ ) is  $s=1$ .

Prior to Base Year 2000, equations (11) and (12) were adjusted to account for the unused capacity, or empty space, on the truck. The expansion process since then adopts the 'compromise method' introduced by the Postal Service and adopted by the Commission in Docket No. R2000-1 (Op. ¶3300). Mathematically, the 'compromise method' is equivalent to removing the empty space adjustment from the expansion process as shown in equations (11) and (12).

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<sup>13</sup> See page 5.

### 3. Distribution Key

The test level cubic-foot-miles obtained from equations (11) and (12) in the previous section is expanded to the stratum level and summed across strata (combined-strata estimator of a ratio). The distribution key is a set of ratios of the expanded cubic-foot-miles for each individual mail category (r) to the total expanded cubic-foot-miles summed across all mail categories:

$$y_r = \frac{\sum_{h=1}^H \left( \sum_{i=1}^{n_h} cfm_{ir} \right) w_h}{\sum_{r \in R} \sum_{h=1}^H \left( \sum_{i=1}^{n_h} cfm_{ir} \right) w_h} = \frac{cfm_r}{\sum_r cfm_r} = \frac{cfm_r}{cfm}, \quad (13)$$

where the stratum weights are:

$$w_h = \frac{M_h}{n_h m_{hi}} = \frac{M_h}{n_h}, \text{ for } m_{hi} = 1. \quad (14)$$

### Variance and Confidence Limits

The distribution key specified in (13) is a combined-strata estimate of the ratio (proportion) of *cfm* for each mail category (r) to total *cfm* across all mail categories. For designs involving two or more sampling stages where the first-stage sample size in each stratum is sufficiently large, such as for VSD, an ultimate cluster estimate of the sampling variance, computed among PSUs (only) within each stratum, can be obtained for the numerator and denominator components of the ratio. After expansion at all subsequent sampling stages (2, 3, etc.), only the first-stage design weight is required for each sampled PSU. To ensure that the sampling error estimates are conservative and not underestimated, the first-stage finite population correction (fpc) for each stratum's estimate is ignored. For the VSD mode, an ultimate cluster approximation is obtained within each stratum to estimate the sampling variance for the stratum's numerator ( $y_{hr}$ ) and denominator ( $y_h$ ) variables. The estimated variance for total *cfm* ( $Y_r$ ) and total *cfm* ( $Y$ ) is the sum of their variances across strata. See Cochran, 6.1.

For normally distributed random variables, the upper and lower 95% confidence limits of an estimate (x) are:

$$x(1 \pm 1.96 \times CV(x)) \quad (15)$$

where  $CV(x)$  is the coefficient of variation (CV) of the estimate, and

$$CV(x) = \frac{\sqrt{Var(x)}}{x} \quad (16)$$

Let  $C_q$  be the volume variable cost for quarter  $q$ , the annual volume variable cost  $C_r$  is thus:

$$C_r = \sum_q C_q y_{rq} \quad (17)$$

where  $y_{rq}$  is the quarterly distribution key estimate from equation (13). To calculate the confidence limits for the annual cost in equation (16), we apply (16) on (17):

$$CV(C_r) = \frac{\sqrt{Var(C_r)}}{C_r} = \frac{\sqrt{Var\left(\sum_q C_q y_{rq}\right)}}{C_r}$$

Since samples are drawn independently from quarter to quarter, the variance of the sum is the sum of the variances. The CV for the annual cost is thus:

$$CV(C_r) = \frac{\sqrt{\left(\sum_q C_q^2 Var(y_{rq})\right)}}{C_r} = \frac{\sqrt{\sum_q (C_q y_{rq})^2 (CV(y_{rq}))^2}}{\sum_q C_q y_{rq}} \quad (18)$$

The confidence limits of the annual cost can be readily calculated from equation (15).